UNIDO

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

REGIONAL CONSULTATION ON THE INDUSTRIAL UTILIZATION OF MEDICINAL AND AROMATIC PLANTS IN ASIA AND THE PACIFIC

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Explanatory notes

The following abbreviations of organizations are used in this report:

ECA	Economic Commission for Africa
FAO	Food and Agriculture Organization of the United Nations
IFEAT	International Federation of Essential Oils and Aroma Trades
ITC	International Trade Centre (UNCTAD/GATT)
TBAM	Medicinal Plants Research Centre, Turkey
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHO	World Health Organization

Preface

The System of Consultations is an instrument through which the United Nations Industrial Development Organization (UNIDO) serves as a forum for developed and developing countries in their contacts and discussions directed towards the industrialization of the latter countries. Participants in the Consultations include government officials, as well as representatives of industry, labour, consumer groups and others, as deemed appropriate by the Governments concerned. The System facilitates negotiations among interested parties, at their request, either during or after the Consultation meetings.

Benefits deriving from this activity include the identification of obstacles to industrial development in developing countries; the monitoring of trends in world industry with a view to identifying action-oriented measures for increasing the industrial output of developing countries; and the search for new forms of international industrial cooperation in North-South and South-South relations.

Since the inception of the System[1] in 1975, Consultations have been held on the following industries and topics: agricultural machinery, building materials, capital goods, construction, electronics, fertilizers, fisheries, food processing, industrial financing, iron and steel, leather and leather products, non-ferrous metals, petrochemicals, pharmaceuticals, small- and medium-scale enterprises, training of industrial manpower, vegetable oils and fats, and wood and wood products. The System brings together sectoral decision makers to deliberate on and propose concrete measures to accelerate the process of industrialization in developing countries. It has generated many innovations, particularly with respect to technological alternatives, integrated development and contractual arrangements. The many opportunities thus provided have led to the implementation of projects in technical cooperation, investment promotion and technology transfer.

The Consultation process, by virtue of its consensual and normative character, has revealed itself to be an efficient vehicle for fostering cooperation. It is eminently suited to assist member States in the formulation of strategies and policies for industrial development.

The System of Consultations operates under the continuous and close guidance of the Industrial Development Board of UNIDO. In addition to undergoing annual reviews and periodic appraisals, the System was subjected to an in-depth evaluation in 1989, which concluded that it was making a major contribution to the development and formulation of UNIDO policies and programmes in specific sectors through integration and interaction with the other main activities of UNIDO.

The Industrial Development Board, at its sixth session, held from 28 May to 1 June 1990, approved the programme of Consultations proposed by the Director-General of UNIDO for the biennium 1992-1993 including a Regional Consultation on the Industrial Utilization of Medicinal and Aromatic Plants in Asia and the Pacific.[2]

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[1] See *Report of the Second General Conference of the United Nations Industrial Development Organization* (ID/CONF.3/31), chap. IV, "The Lima Declaration and Plan of Action on Industrial Development and Co-operation", para. 66.

[2] "Report of the Industrial Development Board on the work of its sixth session, 28 May-1 June 1990" (GC.4/2), IDB.6/Dec.5, para. (e).

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Introduction

1. The Regional Consultation on the Industrial Utilization of Medicinal and Aromatic Plants in Asia and the Pacific was held at Vienna, Austria, from 5 to 8 July 1993. The Consultation was organized by the United Nations Industrial Development Organization (UNIDO) and co-sponsored by the World Health Organization (WHO). It was attended by 75 participants from 32 countries and eight international and other organizations (see annex I).

Background

2. The importance of medicinal plants as therapeutic agents and as part of the health-care programmes and economies of developing and industrialized countries is well established. The Third Consultation on the Pharmaceutical Industry, held at Madrid, Spain, from 5 to 9 October 1987, laid special emphasis on the industrial-scale utilization of medicinal and aromatic plants. Recognizing the importance of herbal medicine and drugs derived from medicinal plants for the health of a large segment of the world's population, the Consultation placed stress on research and development, especially in areas such as agrotechnology, processing technology, quality control and pharmacological, clinical and regulatory requirements as well as marketing and urged the propagation of such medicines and their incorporation in national health-delivery systems. The Consultation also concluded that aromatic plants generated volatile essential oils and other useful ingredients that were important for pharmaceuticals, fragrances and flavourings, and hence that they needed to be developed, industrially and commercially, for their economic potential.

3. The region covering Asia and the Pacific was chosen as the focus for the first Regional Consultation because of its particular advantages over other regions, such as the availability of well-documented knowledge and its long-standing practice of traditional medicine as shown, for instance, by the Arabic, Chinese, Indian, Japanese, Korean and Thai experiences as well as the abundant availability of flora.

4. It was also chosen for its potential to expand cooperation further between its constituent States and thereby provide a boost to the systematic development of the subsector.

Preparatory activities

5. The preparatory meetings for the Regional Consultation held by UNIDO at Milan and Vienna in March 1992 and November 1992, respectively, reached several conclusions and recommendations, which emphasized the strengthening of technological capabilities, the exchange of information and the improvement of the technical cooperation projects being implemented in developing countries. They also helped to identify the specific and priority issues to be submitted to the Regional Consultation. The meetings were able to discuss ways and means of promoting active subregional, regional and international cooperation, with special emphasis on the technical cooperation and investment projects needed to overcome constraints to, and provide opportunities for, developing the subsector. Amongst the other topics for discussion were the prerequisites for the integration of the medicinal-plant-based industry through planning, development of agrotechnology, process technology, standardization, and pharmacological and regulatory aspects as well as the introduction of its products in the national

health-delivery system. Consideration was also given to measures to enhance the commercial potential and increased value-added of raw and processed plant-based materials and products.

Objectives

6. The main objectives of the Regional Consultation were twofold. First to discuss strategies and methodologies for a systematic and integrated approach towards developing the medicinal and aromatic plant subsector and ensuring its sustained growth. An attempt would therefore be made to formulate concrete action-oriented recommendations addressing policy matters as well as technological, pharmacological and financial aspects. In doing so, due account would be taken of the key role that international cooperation played in developing and strengthening capabilities at the national, regional and international levels in areas of agrotechnology, modernization of traditional remedies through industrial-scale production, and use of modern technologies for processing and manufacturing standardized plant extracts, pure active compounds and aroma chemicals, as well as quality control, pharmacological evaluation, research and development, regulatory requirements and mechanisms, development of human resources and entrepreneurship, marketing and trade. The second main objective was to promote contacts between participants with a view to enhancing the developmental potential of projects for technical cooperation, technology transfer and investment promotion in mutually beneficial areas of the phytopharmaceutical, aroma chemical and essential oil industries and thus improve the economic exploitation of local resources.

The issue

7. As a result of the detailed discussions at the preparatory meetings, the issue proposed for submission to the Regional Consultation was: "Integrated development of industrial utilization of medicinal and aromatic plants in countries of Asia and the Pacific region." Furthermore, it was considered that the issue should comprise the following five sub-items:

(a) Policies covering health, agricultural, industrial and trade aspects;

(b) Agrotechnology and process technology for the industrial-scale production of herbal preparations, phytopharmaceuticals and aroma chemicals and essential oils; quality assurance, pharmacological evaluation and regulatory requirements;

(c) Strengthening research and development activities;

(d) Human resource development for specialized technical and managerial skills; entrepreneurship and marketing aspects;

(e) Regional and international cooperation for the development of the subsector.

Agreed conclusions and recommendations

8. The Regional Consultation agreed on the conclusions and recommendations set out below.

Conclusions

(1) Medicinal plants play a key role in world health. Herbal medicines bridge the gap between the availability of and demand for medicines, especially at the community level, in developing countries. Thus, the need for a systematic, integrated approach to the industrial utilization of medicinal plants is stressed. Such an approach could include the development of coherent national policies covering such aspects as the identification of medicinal plants and agro- and process technologies, and the cultivation of such plants, research and development, and human-resource-development facilities for the industrial-scale production of medicines based on these plants.

(2) Given the widespread reliance and dependence on plant-based medicines, official government recognition of their use and their incorporation in national health-delivery systems is considered essential. To that end and taking into account the traditional and accumulated knowledge, due consideration should be given to the phytotherapeutical assessment of herbal medicines for human use and also to regulatory measures governing their use in therapy.

(3) For the national registration of manufactured herbal medicines, the Guidelines for the Assessment of Herbal Medicines of WHO should be adapted to national requirements. Similarly, in order to evaluate the safety and efficacy of herbal medicines, the research guidelines prepared by WHO should be taken into account.

(4) The industrial utilization of medicinal and aromatic plants should be undertaken with conservation measures in mind. The collection of plants in the wild should be kept to the minimum and carried out under controlled conditions. The adaptation of medicinal plants from the wild should be undertaken widely and should ensure the availability of pharmacologically active constituents and/or materials through improved genetic plant breeding.

(5) In the context of conservation measures, attention is drawn to the obligations assumed by the international community at the United Nations Conference on Environment and Development[1] for the rational, sensible and sustainable utilization of local flora and fauna, which includes viable conservation policies and programmes.

(6) The industrial-scale use of aromatic plants for essential oils, flavours and fragrances contributes to the economies of developing countries through improved export earnings and import substitution as well as through employment creation and the alleviation of poverty in communities.

(7) The deployment of modern agro- and industrial technologies for the development of the subsector should be further pursued. In addition, appropriate information systems need to be developed. Research and development activities related to products, industrial

processes and quality control, and the development of human resources, creativity and entrepreneurship in further strengthening trade in this subsector should be accorded a high priority.

(8) The scarcity of resources, such as raw materials, finance and technical skills, calls for increased cooperation between developing and developed countries as well as between the developing countries themselves. The role of international organizations and industry in the promotion of cooperation in the development of the subsector is self-evident.

Recommendations

(9) As a result of the above conclusions, the participants recommend the steps set out below, which should be taken at the national, regional, interregional and international levels to facilitate the systematic development of medicinal and aromatic plant-based industries.

National level

(10) The formulation of an appropriate national policy should constitute an important, initial step towards the utilization and industrialization of medicinal and aromatic plants. For this purpose, Governments should establish national committees comprising experts from the sectors of industry, agriculture, health and commerce as well as from related research institutions. These committees could help to evaluate the needs and resources of the subsector and to formulate policies, strategies and plans for its development.

(11) While it is recognized that some developing countries have enabling policies for the development of this subsector, many others will need to formulate policies that must take account of all related aspects. These policies should cover, at the minimum, such aspects as:

(a) The country-wide promotion of the use of herbal medicines as well as their incorporation in the national health-delivery system. Such a programme could form part of the promotion of the national heritage and import substitution efforts for certain pharmaceuticals;

(b) The introduction of a basic knowledge of plant-based medicines into the educational curricula of all levels of health professionals and related disciplines;

(c) The formulation and/or strengthening of policies for establishing national drug regulatory and registration authorities for plant-based medicines;

(d) The enactment of policies that will facilitate the development of small- and medium-scale industries for the production of essential oils, aroma chemicals etc. from aromatic plants for local consumption and export;

(e) The incorporation of conservation as the central theme in policies related to the development of this subsector, it being recognized that conservation is a shared responsibility of the developing and developed countries.

(12) An information centre for the collection and dissemination of information on technical and trade aspects should be established and/or strengthened by interested Governments. United Nations bodies such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), UNIDO and the International Trade Centre (UNCTAD/GATT),

should participate in providing assistance towards the establishment and maintenance of such a centre through technical support.

Industry level

(13) Industries and research institutes, especially those in developed countries, could provide learning or training opportunities for technical and managerial personnel from developing countries in all aspects of the manufacture of plant-based products.

(14) Industries in developed countries should be encouraged to undertake joint ventures with partners from developing countries.

(15) Industry at the national level should initiate schemes to modernize production processes for the manufacture of herbal medicines, phytochemicals, aroma chemicals and essential oils on an industrial scale using good manufacturing practices (GMP) and quality management systems.

(16) Industry at the national level should also encourage the use of multi-purpose pilot plants for process development. The polyfunctional pilot plant for the processing of medicinal and aromatic plants designed by UNIDO, which has proved to be successful, should be adapted to local conditions. The local fabrication of such multi-purpose plants should be encouraged wherever possible.

Regional and international level

(17) UNIDO, WHO and other relevant international bodies, such as the Food and Agriculture Organization of the United Nations (FAO) and UNESCO, should continue to expand, in conformity with their respective mandates, the technical assistance or collaboration programmes in the subsector by introducing modern technologies, including new quality assurance systems, updated managerial and technical training and know-how, and strengthening the research and development capabilities of developing countries, as well as the adoption by them of good agricultural and manufacturing practices. The identification and creation of centres of excellence is proposed.

(18) International organizations, including UNIDO and WHO, should:

(a) Further strengthen training programmes for technical and managerial personnel from developing countries;

(b) Continue to identify and strengthen research institutions in developing countries in the industrial sustainable utilization of medicinal and aromatic plants, including conservation and cultivation;

(c) Continue to organize periodic consultations at regional levels with the aim of further developing the subsector. The next Consultation on the industrial utilization of medicinal and aromatic plants should be held in Africa.

(19) In collaboration with the organizations and Governments concerned, UNIDO should pursue, within the producing countries, coordinated programmes of converting raw materials into processed and semi-processed products for local use and export.

(20) UNIDO should encourage and support the establishment of regional and interregional centres to assist countries in the industrial utilization of medicinal and aromatic plants. It

should also consider the issuance of a periodic newsletter that would inform its readers about the developments in this subsector.

(21) UNIDO should pursue the idea of establishing a panel of outside experts that would act as an advisory body for UNIDO activities in this subsector. The panel should be composed of 10 to 12 independent experts representing various disciplines and regions and selected on the basis of their proven competence. In this connection, the generous offers of collaboration made during the Consultation by different associations of manufacturers of plant-based products is appreciated.

(22) The World Intellectual Property Organization (WIPO) and other international organizations should collaborate with UNIDO in developing guidelines on patents, patent rights and intellectual property rights for adaptation in countries in the industrial utilization of medicinal and aromatic plants.

(23) ITC (UNCTAD/GATT) should consider updating and expanding its information base of trade and marketing data on raw materials and value-added products in this subsector. The updated information should be disseminated widely in order to assist developing countries in identifying and selecting appropriate plants for cultivation, processing and trade. Selected medicinal and aromatic plants should also be tested by the newly developed Business Opportunities Information Service of ITC.

I. Organization of the Regional Consultation

Opening of the Regional Consultation

Statement by the Director-General of UNIDO

9. The Director-General of UNIDO, in welcoming the participants, underlined the fact that the Consultation was being co-sponsored by WHO, which was an expression of the importance that the United Nations system attached to the development of the medicinal-plant-based subsector of the pharmaceutical industry. He thanked the Director-General of WHO and his colleagues for their support and contributions to the Consultation.

10. The Director-General emphasized the role that herbal medicines and drugs based on medicinal plants played in the health-care programmes of a large segment of the world's population. He stressed the need to overcome the constraints that inhibited the development of the subsector and hoped that the Consultation would help to determine the most effective means by which the industrial development of the subsector could be assured. He put particular emphasis on the necessity of complete and full cooperation between Governments, intergovernmental bodies, non-governmental organizations and entrepreneurs, and pointed out that the System of Consultations offered a uniquely practical platform for discussion between all partners involved in the development of a given industrial sector. He noted that the agenda of the Consultation included not only discussions on issues involved in the development of the subsector, but also formal arrangements to facilitate discussions on technical cooperation and industrial investment projects.

Statement by the Director of the System of Consultations Division

11. The Director of the System of Consultations Division said that the aim of each Consultation was to discuss various facets of the problems faced in the development of an industrial sector and to make recommendations that were operationally feasible and comprehensive so as to involve all the major industrial actors both at the national and international levels. He expressed the hope that the recommendations resulting from the Consultation would be based on a realistic assessment of the current situation and the problems and prospects of the subsector. The exchange of experience and the agreed conclusions and recommendations of the Regional Consultation would help WHO, UNIDO, Governments and industry to introduce policy measures to improve the development of the industrial utilization of medicinal and aromatic plants.

12. He concluded by stressing that international cooperation remained the only viable and desirable alternative if what was being sought was not only industrial growth, but also primary health-care coverage and economic development.

Statement by the representative of the World Health Organization

13. The representative of WHO welcomed the opportunity of cooperation with UNIDO and drew attention to the main issue on the agenda of the Regional Consultation; namely, the integrated

development of the industrial utilization of medicinal and aromatic plants, and stressed the need for national policies and action to achieve that goal. She stated that about 80 per cent of the world's population still relied mainly on traditional remedies and medicines based on medicinal plants for meeting their primary health-care needs, particularly in the countries of Asia and the Pacific. She observed that, despite the widespread use of traditional remedies and medicinal plants in the region, the situation concerning their industrial utilization varied greatly from one country to another. While in some countries the industrial utilization of medicinal plants had improved in terms of production and quality control, in others the lack of appropriate quality assurance systems still remained a major issue.

14. She stated that WHO was planning to lay down a series of guidelines and procedures for improving assessment, administration, quality control, clinical trials and research as well as the conservation of herbal resources to ensure the safe, effective and sustainable application of herbal medicines.

Presentation of the activities of UNIDO

15. A representative of the Secretariat presented an overview of UNIDO technical cooperation activities in the industrial utilization of medicinal and aromatic plants. He stated that UNIDO activities, in addition to Consultations, involved exploratory, promotional, consultative and technical cooperation programmes, the aim being to contribute to industrial development, health-care delivery systems, rural development, biodiversity, conservation and export earnings.

16. He then described the measures used to strengthen the capabilities of the human resources required for agrotechnology, process technology, quality assurance, research and development, marketing and export. He also explained the concept of the polyfunctional pilot processing plant designed by UNIDO and its vital role in bridging the gap between research findings and their transfer to industry.

17. He indicated that UNIDO offered support services such as information databases, reports and reference materials, and assistance in regulatory matters related to registration, as well as in establishing contacts with potential importers.

18. Another representative of the Secretariat described the activities of the industrial investment programme of UNIDO. He explained how it assisted private-sector industrialists in developing countries to identify, formulate and promote their investment projects, thereby enabling them to conclude business agreements for the purpose of obtaining the investment resources required for the implementation of their projects.

Election of officers

19. The following officers were elected:

Chairman:	Sami A. Khalid (Sudan), Dean, Faculty of Pharmacy, University of Khartoum
Vice-Chairmen:	Chlodwig M. Franz (Austria), Head, Institute for Applied Botany and Food Science, University of Veterinary Medicine
	Govind D. Kelkar (India), Chairman, CHEMEXIL
Rapporteur:	Navaid ul Zafar (Pakistan), Managing Director, Hamdard Laboratories

Adoption of the agenda

20. The following agenda was adopted:

1. Opening of the Consultation.

2. Election of the Chairman, Vice-Chairmen and Rapporteur.

3. Adoption of the agenda and organization of the work.

4. Presentation of UNIDO activities concerning technical cooperation programmes in the field of medicinal and aromatic plants as well as industrial investment promotion.

5. Presentation by the UNIDO Secretariat of the issue and its sub-items:

   "Integrated development of industrial utilization of medicinal and aromatic plants in countries of Asia and the Pacific region":

   (a) Policies covering health, agricultural, industrial and trade aspects;

   (b) Agrotechnology and process technology for the industrial-scale production of herbal preparations, phytopharmaceuticals, aroma chemicals and essential oils; quality assurance, pharmacological evaluation and regulatory requirements;

   (c) Strengthening research and development activities;

   (d) Human resource development for specialized technical and managerial skills; entrepreneurship and marketing aspects;

   (e) Regional and international cooperation for the development of the subsector.

6. General discussion of the issue.

7. Discussion, identification and negotiation of technical cooperation projects.

8. Discussions on promotion, identification and negotiation of industrial investment projects.

9. Adoption of conclusions and recommendations of the Consultation.

10. Closure of the Consultation.

Documentation

21. The documents issued prior to the Consultation are listed in annex II.

Adoption of the conclusions and recommendations

22. The conclusions and recommendations of the Regional Consultation on the Industrial Utilization of Medicinal and Aromatic Plants in Asia and the Pacific were adopted by consensus at the final plenary on 8 July 1993.

Concluding statements

23. At the closing plenary, a representative of WHO noted with satisfaction the results of the Regional Consultation, which in his view could be considered as a complete programme for the promotion and development of the industrial utilization of medicinal and aromatic plants in the region covering Asia and the Pacific. He stressed the need for a strong political will on the part of Governments and for cooperation between North and South in implementing the programme.

24. He briefly referred to the WHO programme of assistance in the development of national drug policies, guidelines and regulations etc. for the development of the health sector and reiterated its support for the promotion of the rational use of herbal medicine. Finally, he conveyed the gratitude of the Director-General of WHO to the Director-General of UNIDO for having provided WHO with an opportunity of co-sponsoring the important event.

25. The Director of the System of Consultations Division expressed his deep appreciation to the participants for their highly professional contributions to the discussions. He appreciated the efforts of all those who had assisted in the Regional Consultation and thus ensured its success. He thanked the other sister agencies, in addition to WHO, for their active participation in the Consultation. In his opinion, the adoption of the recommendations was not the end but the beginning of a host of new activities in the subsector. UNIDO would follow up all the agreed recommendations and coordinate all offers of, and requests for, technical cooperation as well as investment promotion.

26. The Chairman of the Consultation, in his closing remarks, expressed his satisfaction at the climate of trust and cooperation that had prevailed throughout the Consultation meeting. He felt that the Consultation had made an abiding impact and the most valuable results thus achieved would certainly help to promote and develop the subsector. He expressed his thanks to UNIDO and WHO for their contribution in making the Consultation a success.

II. Report of the plenary sessions

Presentation of the issue

27. A member of the Secretariat, in introducing the issue, stated that every Government wished to improve the health of its people and thereby increase the well-being and prosperity of its country. Industry could contribute to those aims by implementing appropriate policies, strategies and programmes and by taking advantage of modern technologies and research.

28. He then underlined the growing recognition of medicinal plants as a source of therapeutic agents and their role in health-care programmes as well as in the economies of both developing and developed countries. He also stressed the commercial importance of aromatic plants as a source of fragrance materials, aroma chemicals and essential oils.

29. He then called upon the meeting to assess the prerequisites for the integrated development of the medicinal- and aromatic-plant-based industrial subsector by identifying and taking into account the problems and opportunities and thereby arriving at action-oriented recommendations for the development of the subsector.

Summary of discussion

Policies covering health, agricultural, industrial and trade aspects

30. Many participants emphasized that official recognition by national Governments and the adoption by them of policies and strategic steps for the use of herbal medicines in their health-care programmes would be a big step forward in the development of the medicinal-plant-based subsector.

31. A participant explained the status of the use of traditional medicines in the national health-care systems of some countries in the region covering Asia and the Pacific; in China, Japan, the Republic of Korea and Viet Nam, such use was officially endorsed.

32. Some participants stated that one of the initial important steps in implementing a policy on the use of medicinal plants in the health-care system could be the inclusion in the national pharmacopoeia of monographs on the identity, purity, quality and clinical use of medicinal plants.

33. Another participant stated that an important aspect in the development of the medicinal-plant-based subsector in developing countries was the identification of a focal person or body to coordinate relevant activities. Health policy should have the approval of the highest office in the country and coordination between the ministries concerned in the national Government should be achieved through that focal body. Other participants stressed that national committees of experts drawn from the industry, health, agriculture and commercial sectors should be constituted to guide and oversee the development of the subsector.

34. A participant stated that in his country due recognition was accorded to the usage and practice of the system of traditional herbal medicine and the academic institutions offered courses at all levels including postgraduate studies.

35. Some participants stressed the importance of establishing and strengthening the national registration and regulatory bodies for plant-based medicines.

36. Many participants suggested a regional approach to the standardization of extracts and active constituents present in plants. They also stressed that traditional knowledge should be complemented by modern know-how on safety and efficacy.

37. Some participants said that national Governments should show an active interest in the acceptance and development of the use of traditional remedies based on medicinal plants and should establish technical committees comprising traditional healers and scientists, including taxonomists and pharmacologists as well as medical practitioners, to draw up guidelines for the development and propagation of those remedies.

38. Several participants emphasized the need to impart the knowledge related to the properties of herbal and other plant-based medicines through national health education programmes as well as by conducting training courses for medical workers, which would also promote the use of such medicines.

39. Some participants stated that national Governments needed to liberalize policies in providing incentives for the development of small-scale industries based on medicinal and aromatic flora.

40. Several participants were of the view that the guidelines established by WHO, which were available in the form of different documents, should serve as a basis for the formulation of policies on plant-based medicaments by interested national Governments.

41. Some participants stated that the collection of medicinal plant materials from wild sources for industrial use should be discouraged. Efforts should be made to conserve natural resources and to domesticate selected plant species. A high level of pharmacological content should be ensured, using modern cultivation and propagation methods. The development of plant gardens and herbaria were steps in the right direction. It was emphasized that the systematic cultivation of medicinal plants could facilitate industrial-scale processing.

42. In the case of aromatic plants, some participants suggested that the breeding of high-yielding varieties of acceptable quality should be introduced to encourage their industrial utilization.

43. A participant stressed the importance of environmentally friendly methods such as organic farming for the cultivation of medicinal plants.

44. Another participant pointed out that often the supply of medicinal plants as raw material was not satisfactory. He, therefore, urged that initiatives should be taken by developing countries to assure the adequacy of supplies through the adoption of modern agricultural and processing techniques.

Agrotechnology and process technology for the industrial-scale production of herbal preparations, phytopharmaceuticals, aroma chemicals and essential oils; quality assurance, pharmacological evaluation and regulatory requirements

45. A participant emphasized that human beings were the ultimate beneficiaries of the usage of plant-based products; therefore, in addition to increasing the availability of those products through the local

manufacture of medicaments on an industrial scale, steps covering quality and safety measures including dispensing by qualified personnel were of the utmost importance.

46. Some participants stressed the importance of the industrial-scale utilization of aromatic plants since they offered economic benefits. It was also considered that the essential oils produced in developing countries, owing to the simplicity of the production process, could be used as substitutes for the imports of similar items, for export or as value-added items. The potential to generate foreign exchange earnings and to create employment, thus alleviating poverty, was stressed.

47. A participant stated that the United Nations organizations concerned should provide financial, as well technological assistance, to encourage farmers to cultivate plants that were required by the medicinal and aromatic plant-based industry.

48. Another participant said that technological needs included not only cultivation, but also processing. The laying down of specifications on the cultivation, collection, storage and transportation of medicinal and aromatic plants should also be encouraged. He further stated that developing countries needed to have new skills in technology management including technology negotiation.

49. Some participants expressed their concern about the erosion of plant resources, which could jeopardize the medicinal and aromatic plants industry in the future. It was stressed that, in exploiting raw materials and natural resources, considerable attention should be paid to conservation. Advantage should be taken of modern conservation methods and related techniques. It was observed also that more efforts were needed to promote the domestication of selected species of medicinal and aromatic plants. United Nations organizations were requested to assist developing countries in that entire area of activity.

50. Many participants said that UNIDO and WHO should assist in establishing a list of priority medicinal and aromatic plants for domestication to encourage their industrial-scale utilization. Such a list should be prepared on a country and/or regional basis, as appropriate.

51. The participants were advised that in the area of information dissemination, computerized information services were currently available from the Industrial Technological and Information Bank (INTIB) of UNIDO, UNESCO, ITC and specific centres in Turkey and China. In the latter case, the information was available only in Chinese.

52. Many participants complimented the steps taken by UNIDO in introducing a pilot plant with polyfunctional capabilities as a significant contribution towards the scaling-up of laboratory-scale findings to the industrial-scale processing of plant-based materials. The design for the polyfunctional processing plant developed by UNIDO should be used to fabricate similar processing plants using local engineering capabilities. Some participants stressed that the multi-purpose pilot plant should be supported by sufficiently equipped process control facilities to ensure the production of plant-based materials of a high quality.

53. A participant believed that manufacturers' associations should draw up the quality specifications needed for the development of plant-based products. As an example, he cited the case of essential oils where the International Federation of Essential Oils and Aroma Trades (IFEAT) had drawn up guidelines and standards. He also said that aromatherapy was a growing trend; it generated a demand for natural oils from organically grown herbs without any rectification or fractionation, thus ensuring that the oil produced had to be original, genuine and in no way chemically treated. Developing countries, as suppliers of such oils from well-defined authenticated botanical materials, should pay due attention to that trend, thus ensuring products of the highest quality.

54. A participant stated that industrial development in the subsector could only be promoted if the systematic production of raw materials and appropriate quality control were guaranteed following established guidelines for good agricultural practice (GAP), good manufacturing practice (GMP) and good laboratory practice (GLP).

55. The view was expressed that UNIDO should publish a quarterly information bulletin on the developments taking place worldwide in the subsector as well as the activities being undertaken by UNIDO. To be useful, such a bulletin would need to be up to date and to reach its readers rather quickly.

56. Some participants stated that in developing countries, especially in the African region, there was an increasing need to strengthen technological capabilities and capacities for the industrial processing and utilization of medicinal plants. This measure would provide value-added diversification of products instead of the current mere sale and export of raw materials.

57. It was proposed that UNIDO and other international organizations should assist developing countries in formulating and implementing programmes to convert plant-based raw materials into processed and semi-processed products both for the domestic and export markets, keeping in mind the import-substitution and export-earning possibilities of the subsector.

58. A participant stated that in terms of technology hardware, developing countries needed to have the capability to fabricate some basic equipment. For new technologies, developing countries should be trained to use modern equipment so that it could be employed effectively.

59. Many participants stressed the importance of quality control of plant-based raw materials with emphasis on their purity and homogeneity.

60. Some participants elaborated on the regulatory arrangements in their countries and stressed the need for establishing regulatory bodies. A participant stated that regulations for herbal medicines had long existed in his country and that they were being updated in line with provisions of the European Economic Community directives.

61. The role of top management was stressed as being of critical importance in quality control in the whole chain of production from seeds to the final consumer products. It was emphasized that the responsibility for quality control must be totally separate from that of production to avoid a possible collusion of vested interests.

62. A participant stated that acceptable quality control standards did not require the installation of sophisticated and expensive equipment, but could be achieved by adequately trained personnel with simple and dependable methods and instrumentation.

63. Several participants welcomed the efforts of WHO in preparing research guidelines for evaluating the safety and efficacy of herbal medicines. It was proposed that UNIDO should develop guidelines on quality specifications for plant extracts as well as for processed products.

Strengthening research and development activities

64. Many participants expressed the need for a serious dialogue between academia and industry that would lead to industry-oriented research. It was suggested that UNIDO could provide the framework for such a dialogue to enhance interaction.

65. A participant, stressing the need for disease- or objective-oriented research in the field of medicinal and aromatic plants, observed that national Governments should promote research and development activities by providing various incentives.

66. Another participant observed that the development of local processing facilities should be given priority by conducting research and development activities in the country where the raw material was produced.

67. It was recognized that the commercialization aspect of the technologies developed by research and development institutions was very weak. There was a strong need to facilitate the transfer of technologies from research laboratories for the industrial-scale production of commercial products. Hence, in addition to pilot-plant development initiatives, UNIDO and ITC were called upon to enhance their activities so as to facilitate the commercialization of technologies and, consequently, to assist in the development of local industry.

68. Some participants observed that in order to protect individuals, institutions and countries, it was necessary that appropriate guidelines on patents, patent rights and intellectual property rights should be developed. It was proposed that UNIDO and other international organizations, such as WIPO, should collaborate in developing such guidelines for adaptation in countries for the industrial utilization of their medicinal and aromatic plants.

69. A participant said that owing to the limited cost-benefit ratio of medicinal and aromatic plant research, local research and development needed to be stimulated by adequate government support and by strengthening intellectual property rights to ensure a proper return on the resources deployed.

70. A participant proposed the creation of regional centres by United Nations organizations such as FAO, UNESCO, WHO and UNIDO to initiate research and development activities and to serve also as training centres for human resource development. Another participant stated that, instead of creating new centres, existing research and development centres in developing countries should be strengthened. He also proposed that efforts should be made to support and develop the existing Medicinal Plants Research Centre in Turkey (TBAM), thus making it capable of serving as an international centre in the field of medicinal and aromatic plants.

Human resource development for specialized technical and managerial skills: entrepreneurship and marketing aspects

71. Several participants observed that the technical training available in developing countries was very limited. More technical training programmes should be encouraged, especially on-the-job training in the industry. In addition, it was considered that the preparation of training manuals could have a multiplier effect in the area of training and should, therefore, be encouraged and supported.

72. A participant emphasized that FAO, WHO and UNIDO should organize training courses for cultivators, physicians and industrial workers in the cultivation, industrial and medical use of medicinal and aromatic plants, as well as quality management.

73. A participant said that there was a need for research and development centres to become more involved in human resource training, thus strengthening their linkages with industrial enterprises.

74. Several participants stressed that technical know-how and training skills were considered an important requisite for the industrial development of the subsector. The need for human resource

development through training programmes in various disciplines and at all levels of management was emphasized. A number of participants described the training facilities in their countries and offered to make them available to personnel from developing countries.

75. Emphasis was also placed on the need to involve rural communities in the domestication, cultivation and harvesting of medicinal and aromatic plants. A participant described a number of successful cases where such efforts had been undertaken on a community basis in the region covering Asia and the Pacific.

76. A representative of the Secretariat gave a brief description of the guiding principles of UNIDO activities for human resource development.

Regional and international cooperation for the development of the subsector

77. In order to strengthen subregional, regional and international cooperation in the utilization of medicinal and aromatic plants, the participants were generally of the view that existing facilities should be used in an efficient and coordinated manner by the developing country concerned. A participant referred to TBAM in Turkey which, after the technical cooperation provided by UNIDO, was said to be in a position to provide a range of tailor-made services to other developing countries for the promotion of medicinal and aromatic-plant-based industries. It was further stated that similar capabilities were being established in Thailand, which would be available in due course to developing countries in the region.

78. The importance of exchanging information between countries on various aspects related to medicinal and aromatic plants was stressed. The establishment and strengthening of information centres on technical as well as commercial aspects was considered an important step. A participant stated that the issuance of a regular newsletter on developmental activities in the subsector should be considered.

79. United Nations entities participating in he Consultation (ECA, FAO, UNESCO, WHO and ITC) provided detailed accounts of the activities and capabilities of their organizations in the subsector and the ways in which they could extend technical cooperation to interested countries. In view of the wide range and diversified nature of those activities, one participant suggested that it might be expedient to compile a directory on the availability of such services to enable developing countries to locate and secure speedily the inputs required for their national efforts to promote the subsector.

80. Many participants stated that in view of the scarcity of financial resources and shortage of qualified human resources in the developing countries, scientific and technological research was a luxury that few countries could afford. Therefore, there was an urgent need for the research community to focus on the specific and narrowly defined needs of the subsector instead. UNIDO and other international agencies were requested to facilitate that process through their technical cooperation activities.

81. Some participants expressed their willingness to cooperate with other developing countries in the utilization of medicinal and aromatic plants. They were, however, not always in a position to do so in view of the purely national orientation of their sectoral activities. They requested the assistance of international agencies in converting that domestic experience into a form that would be accessible to other developing countries.

82. Several participants pointed to the desirability of adapting existing facilities for the production of modern pharmaceuticals to the requirements of processing medicinal- and aromatic-plant-based substances. Such usage of equipment would gain even more relevance in many developing countries in view of the low capacity utilization of installed facilities. International and industry-to-industry cooperation was needed for that task.

83. Some participants requested ITC to update the market information that it had prepared previously. ITC indicated its willingness to undertake that task, subject to availability of financial resources.

84. Other participants proposed that a working group at the international level should be established by UNIDO with a view to providing advice on activities related to the industrial utilization of medicinal and aromatic plants, as well as to providing inputs for the development of the subsector. Two participants who were members of the World Federation of Proprietary Medicines' Manufacturers (WFPMM) and IFEAT, respectively, indicated that there would be an interest by those two organizations in collaborating with UNIDO.

85. The efforts made by UNIDO and WHO in convening the Regional Consultation on the Industrial Utilization of Medicinal and Aromatic Plants in Asia and the Pacific were generally appreciated. It was felt that such a meeting contributed considerably towards the development of the subsector. The development of the subsector offered opportunities for community welfare, employment generation and poverty alleviation. Some participants urged that the next meeting on the subsector should be specific to the problems of Africa and should take place in Africa.

86. Some participants believed that in order to promote partnerships for industrial development, Governments in the developing countries should introduce incentive measures to encourage national industries to undertake joint ventures with partners in developed countries.

87. During the discussion on the types of technical cooperation delivered by UNIDO, the Secretariat presented a detailed account of the mechanisms through which the different types of funding could be requested by interested parties depending on the type of assistance required. Different funding sources including self-financed trust-fund schemes were described and the procedures for developing projects and drafting project documents explained. Specific requests received from participants for technical cooperation were discussed, and the modifications required and the mechanism through which such requests should officially be sent to UNIDO were explained. Some participants stated that their requests would be transmitted through official channels for follow-up action.

Note

[1]*Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992* (United Nations publication, Sales No. E.93.I.8), vol. I.

Annex I

LIST OF PARTICIPANTS

Algeria

Bechiri Zemal, Sous-Directeur de la Pharmacie, Ministère de l'industrie et des mines, Immeuble Le Colisée, rue Ahmed-Bey, Alger (Telefax: 603784)

Abdelkader Aziria, Counsellor, Permanent Mission of the People's Democratic Republic of Algeria to UNIDO, Rudolfinergasse 17-19, A-1190 Vienna, Austria (Telefax: 368856)

Austria

Dr. Chlodwig M. Franz, Head, Institute for Applied Botany and Food Science, Veterinärmedizinische Universität, Linke Bahngasse 11, A-1030 Vienna
(Telephone: 711 55 279)

Roland Leithenmayr, General Manager, InfraMarket (Trade & Consulting), Bockkellerstrasse 8-5, A-1190 Vienna (Telefax: 00431-376873)

Bangladesh

M. Matiur Rahman, Director, Bangladesh National Herbarium, Barc, Dhaka 1215
(Telephone: 311 273)

Belgium

Dr. Hubertus Cranz, Director, The European Proprietary Medicines Manufacturers' Association (AESGP), 7, avenue de Tervuren, B-1040 Brussels (Telefax: 322 735 5222)

Burundi

Gabriel Fumba, Director, Center for Research and Promotion of Traditional Medicine, B.P. 1764, Bujumbura (Telephone: 225854)

China

Gu Jianmei, Division Chief, Economic Co-operation Division, The State Pharmaceutical Administration of China (SPAC), A 38, Beilishilu, Beijing 100810 (Telefax: 0861 8315648)

Colombia

José Armando Porras Niño, Director, Science and Technology, Ministry of Health, Calle 16 No. 7-19, Oficina 502, Santafé de Bogota (Telefax: 2-842400)

Ethiopia

Dr. Berhanu Abegaz, Director of Research and Publications, Department of Chemistry, Addis Ababa University, P.O. Box 1176, Addis Ababa (Telephone: 2511 111514)

France

Christian Meillon, Ministère de la coopération, Sous-Direction Santé, Ministère de la coopération, 1 *bis*, avenue de Villars, 75007 Paris (Telephone: 331-4783 0171)

Simone Rousseau, Pharmacien, Direction de la pharmacie et du médicament, Ministère de la santé, 143, boulevard Anatole-France, 93200 Saint-Denis (Telefax: 1-48132003)

Pierre Dominique Cabalion, Organisation de la recherche scientifique et technique outre-mer (ORSTOM), 213, rue Lafayette, 75480 Paris Cedex 10 (Telephone: 4803 7583)

François Clostre, Directeur de recherche, Institut Henri Beaufour, 17, avenue Descartes, 92350 Le Plessis Robinson (Telefax: 1-4630 1213)

Kamel Kherbache, Synthelabo Pharmacie, 30-38, avenue Gustave-Eiffel, 37100 Tours (Telefax: 0033-47423502)

Dr Stylianos Mamatas Kalamaras, Pierre Fabre Médicaments, Centre de recherche des substances naturelles, Parc technologique du Canal, 11, avenue de l'Europe, 31527 Ramonville-Saint. Agne (Telefax: 61750752)

Bernard Marcel Mompon, Directeur général, ARCHIMEX, Parc d'innovation de Bretagne Sud, Boîte postale no 31, 56038 Vannes Cedex (Telefax: 97475690)

François J.L.E. Patté, Président d'honneur, Association CREDES (Centre de recherches et d'études pour le développement de la santé), 53, rue de Turbigo, 75003 Paris
(Telefax: 42741120)

Didier Alain Postaire, Directeur adjoint, Laboratoire Pierre Fabre, Plantes et industrie, 21 Le Clergous, 16, rue Jean Rostand, B.P. 92, 81603 Gaillac Cedex (Telefax: 00331-63573207)

Isabelle Valade, Département Environnement, Société OTH International, 18, boulevard de la Bastille, 75579 Paris Cedex 12 (Telefax: 00331-44878888)

Germany

Klaus A. Dürbeck, Project Manager, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), Rufstrasse 5, D-83064 Raubling (Telefax: 0608035-8340)

Dr. Bernd Eberwein, Director, German Medicines Manufacturers Association/for World Federation of Proprietary Medicines Manufacturers (WFPMM), Ubierstrasse 73, D-53173 Bonn 2 (Telefax: 06049-228 355861 or 222 478502)

Dr. Wulf Ohlendorf, Head, Medicinal Plants Laboratory, Boehringer Ingelheim KG, Drogenpflanzenlabor, D-55216 Ingelheim am Rhein (Telefax: 0606132-77 2095)

Marcel Schwickert, Sector Manager (Food), Gesellschaft für Technische Zusammenarbeit (GTZ) - Protrade, Goethestrasse 11, D-3554 Altenvers (Telefax: 06196-797414)

Greece

Chrysostomos Karros, Agronomist, Industrial Area of Komotini, Komotini
(Telephone: 0039531-29581)

Hungary

Dr. György Kandra, Vice-Director, Research Institute for Medicinal Plants, P.O. Box 11, József A. St. 68, H-2011 Budakalász (Telefax: 3626-320 426)

Dr. Akos Máthé, Assistant Professor, University of Horticulture and Food Industry, Ménesi Str. 44, H-1118 Budapest (Telefax: 361-267 1388 or 361-122 2579)

Dr. Imre Máthé, Head, Institute of Pharmacognosy, President of Medicinal Plant Section of the Hungarian Pharmaceutical Society, Albert Szent-Györgyi Medical University, Eötvös u. 6, P.O. Box 121, H-6720 Szeged (Telefax: 62-362 6444)

Dr. Károly Zalai, Head of Department (Biotechnology), Chemical Works of Gedeon Richter Ltd., Gyömrói út. 19-21, H-1103 Budapest (Telefax: 361-1571 578)

India

Dr. Sharat Shintilar Gandhi, Medical Director, Gufic Limited, Medical Department, Subhash Road A, Vile Parle (East), Bombay-400 057 (Telefax: 8369008)

Govind D. Kelkar, Managing Director, S. H. Kelkar & Co. Ltd., Chairman, CHEMEXIL (Export Promotion Council), Devkaran Mansion, 36 Mangaldas Road, Bombay-400 002 (Telefax: 2081204)

Vikram Andrew Naharwar, Director (Marketing), Amsar Private Limited, 2 Hormuz Mansion, 72 B. Desai Road, Bombay (Telefax: 3630801)

Syed Rafatullah, Assistant Researcher, 21-4-794 Koka-Bazar, Hyderabad-500 264 (Telephone: 0091842-529483)

Indonesia

Dr. Djoko Hargono, Head, Traditional Drugs Control Directorate, Directorate General of Drugs and Food Control, Ministry of Health, Jalan Percetakan Negara 23, Jakarta 10560 (Telefax: 062021-4243605)

Mohamad Udan Kuswara, General Manager, Research and Technology Division, Pharmaceutical Factory PT Kimia Farma, Jalan Budi Utomo No. 1, Bandung (Telefax: 006222-437079)

Tedjo Rumekso, Head of Non-Wood Industry Section, Perum Perhutani (Forest State Enterprise), Gedung Manggala Wanabakti, Jalan Gatot Subroto Senayan, Jakarta
(Telefax: 021-583616)

Sumarjono Soedargo, Head, Department of Forest Resource Conservation, Faculty of Forestry, Bogor Agricultural University, IPB Bogor, P.O. Box 168, Bogor (Telefax: 0251-215162)

Dr. Soemantri, Assistant to President-Director, Pharmaceutical Factory PT Kimia Farma, Jalan Rawagelam V, Jiep, Pulogadung, Jakarta 10002 (Telefax: 006221-4893524)

Dr. Ervizal Am. Zuhud, Chairman, Plant Conservation Laboratory, Department of Forest Resources Conservation, Bogor Agricultural University, Fakultas Kehutaran, Kampus IPB Darmaga, P.O. Box 168, Bogor (Telefax: 0062251-21562)

Iran (Islamic Republic of)

Dr. Adel Jalili, Deputy Director, Research Institute of Forests and Rangelands, P.O. Box 13185-116, Tehran (Telefax: 21-602 6575)

Ahmad Ahmadi, Alternate Permanent Representative, Permanent Mission of the Islamic Republic of Iran to the United Nations and Other International Organizations, Jaurèsgasse 3, A-1030 Vienna, Austria (Telephone: 715 3650)

Italy

Massimo de Vincenzi, Research Director - Toxicology, Istituto Superiore di Sanità, Viale Regina Elena 299, 00161 Rome

Lao People's Democratic Republic

Dr. Bounhoong Southavong, Deputy Director, Research Institute of Medicinal Plants, Ministry of Public Health, Vientiane (Telephone: 25951 5480)

Lebanon

Chehade Bejjani, Agricultural Engineer, Chief of Agricultural Service in the Bekaa, Ministry of Agriculture, Zahlé, East Lebanon (Telephone: 08-823524)

Myanmar

U. Kyaw Sein, Deputy Director, Development Centre of Pharmaceutical Technology (D.C.P.T.), P.O. Box 1552, Yangon (Telephone: 01-63567)

Nepal

Tara Keshari Rajbhandari, Acting Director-General, Department of Forestry and Plant Research, Ministry of Forests and Soil Conservation, P.O. Box 2270, Thapathali, Kathmandu (Telephone: 2-11564)

Netherlands

Erik J. van den Ent, Vice-President, Sevenhuijsen Associates, Hubertuslaan 102, P.O. Box 10, 2972 Driebergen (Telefax: 31-3438 16536)

Maya M.X. van den Ent, Research Scientist, Sevenhuijsen Associates, Hubertuslaan 102, P.O. Box 10, 2972 Driebergen (Telefax: 31-3438 16536)

Nigeria

Rebecca Oritsemaje Soremekun, Operations Controller, Pharma-Deko PLC., Plot C15/3, Agbara Industrial Estate, Agbara Ogun State, P.O. Box 1479, Apapa, Lagos
(Telefax: 01-521902)

Charles O.N. Wambebe, Executive Director, National Institute for Pharmaceutical Research and Development (NIPRD), P.M.B. 21, Idu Industrial Area, Abuja, F.C.T.
(Telefax: 2349-523 1043)

Pakistan

Navaid ul Zafar, Managing Director, Hamdard Laboratories (Waqf), Al-Majeed Centre, Nazimabad, Karachi-74600 (Telefax: 9221 6641766, Telex: 24529 hamd pk)

Philippines

Dr. Pacita L. Zara, Executive Director, Philippine Council for Health Research and Development (PCHRD), Department of Science and Technology, General Santos Avenue, Bicutan, Taguig, Metro Manila (Telefax: 632-8238942)

Poland

Dr. Wladyslaw S. Brud, President, Pollena Aroma Co. Ltd., ul. Klasyków 10, 03 115 Warsaw (Telefax: 4822-119228)

Rwanda

Etienne Hakizamungu, Directeur, Centre universitaire de recherche sur la pharmacopée et la médecine traditionnelle (CURPHAMETRA), Institut de recherche scientifique et technologique (IRST), B.P. 227, Butare (Telefax: 250-30939)

Saudi Arabia

Dr. Mansour Solyman Al-Said, Associate Professor, Department of Pharmacognosy, College of Pharmacy, King Saud University, P.O. Box 2457, Riyadh 11451 (Telefax: 4676383)

Sudan

Sami A. Khalid, Dean, Faculty of Pharmacy, University of Khartoum, Sigma-tau Sudan Ltd., Phytopharmaceutical Division, P.O. Box 1996, Khartoum (Telefax: 451743)

Thailand

Dr. Chada Phisalaphong, Researcher, The Research and Development Institute, The Government Pharmaceutical Organization, 75/1 Rama VI Road, Ratchathewi, Bangkok 10400 (Telefax: 00662-2479940)

Sasithorn Wasuwat, Consultant, Pharmaceuticals and Natural Products Department, Thailand Institute of Scientific and Technological Research (TISTR), 196 Phahonyothin Road, Chatuchak, Bangkok 10900 (Telefax: 561 4771)

Turkey

Dr. K. Hüsnü çan Baser, Director, Dean, Faculty of Pharmacy, Anadolu University Medicinal Plants Research Centre, 26470 Eskişehir (Telefax: 9022-350 127)

United Arab Emirates

Dr. Ahmed K. Bashir, Head, Desert Science Section, The Desert and Marine Environment Research Center, United Arab Emirates University, P.O. Box 17777, Al Ain (Telefax: 009713-645277 or 620486)

United Kingdom of Great Britain and Northern Ireland

Michael W. Fowler, Director and Vice-President, Plant Science Limited, Firth Court, Western Bank, Sheffield, S10 2TN (Telefax: 44742-727949)

United Nations Secretariat

Economic Commission for Africa (ECA)

Ibrahima Barry, Industrial Development Officer, Industry and Human Settlements Division, P.O. Box 3001, Addis Ababa, Ethiopia (Telefax: 2511-514416)

Economic and Social Commission for Western Asia (ESCWA)

Akram Karmoul, Chief, Industry Division, P.O. Box 927115, Amman, Jordan (Telefax: 9626-694981)

United Nations International Drug Control Programme (UNDCP)

Floriane de Sadeleer, Legal Officer, Treaty Implementation and Legal Affairs Division, UNDCP, Vienna International Centre, P.O. Box 500, A-1400 Vienna, Austria (Telefax: 431-230 7002)

Specialized agencies and other organizations of the United Nations system

Food and Agriculture Organization of the United Nations (FAO)

Cherukat Chandrasekharan, Chief, Non-Wood Forest Products and Energy Branch, Forest Products Division, Viale delle Terme di Caracalla, 00100 Rome, Italy (Telefax: 57973152 or 5782610 or 57975155)

United Nations Educational, Scientific and Cultural Organization (UNESCO)

Mamadou Seck, Director, UNESCO Liaison Office in Vienna, P.O. Box 1100, A-1400 Vienna, Austria (Telefax: 219 1652)

Massoud Abtahi, Liaison Officer, UNESCO Liaison Office in Vienna, P.O. Box 1100, A-1400 Vienna, Austria (Telefax: 219 1652)

World Health Organization (WHO)

Dr. Xiaorui Zhang, Officer-in-Charge, Traditional Medicine Programme, CH-1211 Geneva 27, Switzerland (Telefax: 791 0746)

Dr. Ken Chen, Medical Officer, Traditional Medicine, WHO Regional Office for the Western Pacific, P.O. Box 2932, 1099 Manila, Philippines (Telefax: 632-5211036)

Dr. Kin Shein, Regional Adviser, WHO South-East Asia Regional Office, World Health House, New Delhi 110002, India (Telefax: 9111-3318607 or 9111-3327972)

International Trade Centre (UNCTAD/GATT)

Paavo Lindholm, Chief, Market Development Section, Palais des Nations, CH-1211 Geneva 10, Switzerland (Telefax: 4122-733 44 39)

Fazli Husain, Senior Commodity Marketing Officer, Market Development Section, 54-56, rue de Montbrillant, Geneva, Switzerland (Telephone: 730-0254)

Other intergovernmental organizations

Gulf Cooperation Council (GCC)

Dr. Abdulrahman Al-Swailem, Executive Director, Executive Board of the Health Minister's Council for GCC States, P.O. Box 7431, Riyadh 11462 (Telefax: 9661-4630885)

Dr. Ali Hussain Al-Zawawi, Head, Drug Affairs, Executive Board of the Health Minister's Council for GCC States, P.O. Box 7431, Riyadh 11462 (Telefax: 9661-4630885)

Observer

Khamidilla Nigmatovich Aripov, Director Institute of Plant Chemistry (IPC), Acad. Abdullaeva st., 70, 700077 Tashkent, Uzbekistan (Telefax: 3712-627348)

Other participants

Dr. Olayiwola Akerele, Consultant, 28, St. Michael's Lane, Borrowdale, Harare, Zimbabwe (Telefax: 2634-702453)

Annex II

LIST OF DOCUMENTS

Disscussion document

Integrated development of industrial utilization of medicinal and aromatic plants in countries of Asia and the Pacific region	ID/WG.530/2(SPEC.)

Background documents

Factors having a bearing on the industrial utilization of medicinal plants for the production of plant-based medicines	ID/WG.530/1(SPEC.)
Medicinal plants and primary health care - an expanded partnership in health	ID/WG.531/2(SPEC.)

Reference documents

Guidelines for setting up data bases on medicinal plants	ID/WG.502/2/Rev.1(SPEC.)
Design options for a polyvalent pilot plant unit for the distillation and extraction of medicinal and aromatic plants	IPCT.143(SPEC.)
Quality control methods for medicinal plant materials	WHO/PHARM/92.559
Guidelines for the assessment of herbal medicines	WHO/TRM/91.4
Research guidelines for evaluating the safety and efficacy of herbal medicines	RS/92/GE/15(PHL)

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